REMARKS

In response to the Office Action dated March 14, 2002, the applicant hereby makes the following response. Claims 1-8 are currently pending with claims 1 and 8 being independent. In this response, claims 1-8 have been cancelled and new claims 9-28 have been added. Applicant respectfully submits that no new matter has been added.

Specification and Drawing Objections

The drawings have been amended in red and the specification has been amended per the suggestions by the Examiner.

Claim Objections

Claims 1 and 2 stand objected for allegedly containing informalities. Claims 1 and 2 have been cancelled.

Rejection Under 35 U.S.C. § 112

Claims 2-5 stand rejected under 35 U.S.C. 112, second paragraph as being allegedly indefinite for failing to particularly point out and distinctly claim the subject matter. Claims 2-5 have now been cancelled.

Rejection Under 35 U.S.C. § 102(b)

Claims 1-5 stand rejected under 35 U.S.C. 102(b), as being allegedly anticipated by *Kuroda et al.* (U.S. Patent No. 5,479,138). Claims 1-5 have been cancelled and new claims 9-28 have been added. Applicant respectfully notes that the *Kuroda et al.* reference does not teach a circuit device wherein the earthed conductor is formed on the second area of the dielectric substrate and the position of each earthed conductor is changeable on the second area to achieve

a desired frequency characteristic. Additionally, the *Kuroda et al.* reference does not teach a method of forming a circuit device wherein the frequency characteristic is adjusted by changing the area and position of the earthed conductor pattern in order to change the distribution of the electromagnetic field between the conductive pattern and the earthed conductor pattern.

Applicants respectfully submit that since Claims 9, 15 and 21 are patentable, all dependent claims therefrom are also patentable.

CONCLUSION

The Applicant respectfully requests withdrawal of the rejection and believes that the Claims as presented represent allowable subject matter. However, if the Examiner desires, the Applicants' attorney is ready for a telephone interview to expedite prosecution. As always, the Examiner is free to call the undersigned at 312-876-7518.

Respectfully submitted,

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6/14, 2002

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6/14/02 Gwen Goldsmith
Date Gwen Goldsmith

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re U.S. Patent Application of: Hirabayashi

Serial No.: 09/641,206

Filed: August 18, 2000

For: CIRCUIT DEVICE AND PRINTED CIRCUIT BOARD

Examiner: S. Jones

Group Art Unit: 2817

Attorney Docket No. 9792909-0398

VERSION TO SHOW AMENDMENTS MADE

In The Specification

Please replace paragraph 1 on page 1 between lines 6-12 with the following substituted paragraph:

--The invention relates to a circuit device and a printed board. More particularly, the invention relates to [a] forming a conductive pattern in an inside layer in the dielectric substrate and an earthed conductor in outside layer in the dielectric substrate. Moreover this invention enables the area and position of the earthed conductor [and a position] to change so that a frequency characteristic, which is set up by conductive pattern, may become [desired] an enhanced characteristic.--

Please replace paragraphs 2 and 3 on page 1 between lines 16-30 and paragraph 1 on page 2 between lines 1-2 with the following substituted paragraph:

--Recently, because of the development of the information and communication technology, mobile communication machines, ISDN and computer devices carry circuit blocks to transmit data at high speed by using the radio or [some] other types of lines.

When such circuit blocks are carried on machines, not only high speed can transmit data but also it hopes for compositions in consideration of the noise. Furthermore, the miniaturization, complexation and multifunctionalization of parts are attempted when circuit blocks are carried on mobile devices. For example, it is unacceptable to realize low-pass filters, high-pass filters, band-pass filers and couplers with lumped parameter circuits using chip parts such as condensers and coils in high frequency applications which [made] use a microwave band and millimeter wave band as a [career] carrier like radio LAN (Local Area Network) and a variety of terminals of the communication devices. So low-pass filters, high-pass filters, band-pass filters and coupler using a distributed parameter circuit like a micro-strip line and strip line are used.--

Please replace the last paragraph on page 5 between lines 29-31 and paragraphs 1-4 on page 6 and the first paragraph on page 7 with the following substituted paragraphs:

--The embodiment of the present invention will become better understood with reference to the following description and drawings. Conductive patterns are formed on the substrate to control circuit devices, moreover, shown in Fig. 4 in the circuit device having earthed conductor which is formed on the dielectric substrate, e.g. [the] a distributed parameter circuit device 10 having a tri-plate structure, lattice-shaped earthed conductor 12 is formed on the dielectric substrate 11 to change the area and position of the earthed conductor 12. The earthed conductor

patterns by increasing the characteristic impedance at the short circuit side and decreasing the characteristic impedance at the opening side.--

Please replace paragraph 2 on page 7 between lines 10-12 with the following substituted paragraph:

--The earthed conductor 22a connects at said via hole 24 with 22b, and resonator conductive patterns 23a and 23b are shielded with forming layer via hole 24 in the circumference [them].--

Please replace paragraphs 4 and 5 on page 7 between lines 18-30 and the first paragraph on page 8 between lines 1-5 with the following substituted paragraphs:

--Fig. 7 shows the frequency characteristic of the band-pass filter 20 and, in this figure, the frequency characteristic (illustrated by solid line in Fig. 7) in the case of forming the conductive layer 26 having the area 25 without earthed conductor is enhanced in frequency band [wider] width than that (illustrated by dotted line) in the case of deforming the area 25 without the earthed conductor.

Therefore designing resonator conductive pattern and dielectric substrate and forming the conductive layer 26 having the area 25 without the earthed conductor [are provided] provides the desired frequency band having [a] the desired frequency characteristic. When frequency characteristic is wider than desired frequency, you have only to form conductive parts e.g. cooper foil, conductive paste and solder on the area 25 without earthed conductor so that frequency band will be narrow and you can obtain desired band-pass filter having [a] the desired frequency characteristic. On the contrary, when the frequency characteristic is narrower than desired frequency band, you have only to cut the earthed conductor [2a] 22a and make the

frequency band wide so that you can gain desired band-pass filter having [a] the desired frequency characteristic.

Please replace paragraphs 2-4 on page 8 and the first paragraph on page 9 with the following substituted paragraphs:

--How to make the band-pass filter 30 which formed a pattern on the earthed conductor 32, said pattern is that rectangle-shaped non earthed conductive area 35 is formed on resonator conductive pattern or between resonator conductive patterns, as a method which made it change an area and a position of the earthed conductor 32 is by forming the area without earthed conductor 32 on the dielectric substrate, in shown Fig. 8A. In the case the area and position of the earthed conductor 22 can change by forming the conductive parts 38 on the rectangle-shaped area 35 without the earthed conductor 32, in shown Fig. 8B.

Fig. 9 shows the frequency characteristic of the band-pass filter 30, when the conductive parts 38 is formed on the rectangle-shaped area 35 without the earthed conductor 32 in the short circuit side, the frequency characteristic (solid line in Fig. 9) is wider toward high band side than the frequency characteristic (dotted line in Fig. 9) in the case of the deforming conductive parts.

Therefore, forming the conductive parts 38 on the rectangle-shaped area 35 without the earthed conductor 32, changing the position and amount of the conductive parts 38 or changing the area and position of earthed conductor 32 by cutting earthed conductor, enables to obtain the desired frequency characteristic. For example, when the frequency characteristic is narrower in high pass side than the desired frequency band, you have only to form the conductive parts 38 on the rectangle-shaped area 35 without the earthed conductor 32 and make the frequency band narrow in high pass side so that you can get the band-pass filter having desired frequency characteristic. On the contrary, when the frequency characteristic is wider in high pass side than

desired frequency band, you have only to cut the earthed conductor 32 between the rectangle-shaped areas 35 and make the frequency band wide in high pass side so that you can get the band-pass filter having desired frequency characteristic.--

Please replace paragraphs 2-4 on page 9 and the first paragraph on page 1 with the following substituted paragraphs:

--[There is other method that the length in] As shown in Fig. 10, an alternative method is provided to lengthen the signal input and output direction of the rectangle-shaped area 35 without earthed conductor 42, shown in Figs. 8A and 8B, is lengthened to provide the band-pass filtered 40 by forming the rectangle-shaped area 45 without the earthed conductor 42[,shown in Fig. 10A]. In the case, the frequency band (solid line in Fig. 11) in forming the conductive parts 48 on center of each of the rectangle-shaped are 45 without earthed conductor is wider than the frequency characteristic (dotted line in Fig. 11) in deforming the conductive parts 48, shown in Fig. 10B.

Therefore, forming the conductive parts 48 in the center of the rectangle-shaped area 45 without earthed conductor 42, changing the position of the conductive parts 48 or cutting the earthed conductor 42 to change the area and position of the earthed conductor, provides the desired frequency characteristic. For example, when the frequency characteristic is narrower than desired, you have only to form the conductive parts 48 on the rectangle-shaped area 45 without earthed conductor 42 and make the frequency band wide so that you can get the band-pass filter having the desired frequency characteristic. On the contrary, when the frequency characteristic is wider than desired frequency band, you have only to cut the earthed conductor 42 and make the frequency band narrow so that you can get the band-pass filter having the desired frequency characteristic.

Moreover in the band-pass filter shown on Figs. 6A to 6C, the area 25 without the earthed conductor exchanges for the thin-filmed conductive layer 27 shown in Figs. 12A and 12B so that the thin-filmed conductive layer 27 shown in Figs. 12A and 12B so that the thin-filmed conductive layer is cut and processed easily[, you can adjust]. Thus, the frequency characteristic can be adjusted easily by changing the area and position of the earthed conductor 42.--

Please replace paragraphs 3 and 4 on page 10 and the first paragraph on page 11 with the following substituted paragraphs:

[You] One can adjust the frequency characteristic by using said method, when the band-pass filter has the multi-layered structure[,] shown in Figs. 13A to 13C. Even if the wiring pattern layer 53 is formed between resonator conductive pattern 51 and earthed conductor 52 as shown in Fig. 13A, it is able to change the characteristic of the band-pass filter by forming the area 54 without earthed conductor 52. But, in this case, because of forming the wiring pattern layer 53 between resonator conductive pattern 51 and the earthed conductor 52, the amount of adjustment of the frequency characteristic is less than the amount of adjustment of the frequency in non multi-layered structure. When two band-pass filters 55a and 55b have a laminated structure [having] with a unified earthed conductor 56, you can adjust the frequency characteristic by forming the area 57 without the earthed conductor 56 on the outside layer which changes corresponding to the frequency characteristic of the band-pass filter and changing the area and position of the earthed conductor, shown in Fig. 13B. Moreover, if the distance of the side of the substrate having band-pass filter and resonator conductive pattern is short, forming the earthed conductor 58 on side surface and forming the area 59 without the earthed conductor 58 on the side surface of the substrate and changing the area and position of the earthed conductor 58 [is] enables the frequency characteristic to change, shown in Fig. 13C.

The above-mentioned description about said embodiment explains [about] the distributed parameter circuit device as the band-pass filter. When the printed board 60 which [makes] enables a signal processing circuit 62, e.g. MMIC, to mount on the substrate having the distributed parameter circuit device 61, it is possible to change the area and position of the earthed conductor 64 corresponding to the position of conductive pattern for setting up the distributed parameter circuit 61 device connecting at connecting via hole 63 with signal processing circuit by forming the pattern on the earthed conductor 64, shown in Fig. 14.--

Please replace paragraphs 3 and 4 on page 11 and the first paragraph on page 12 with the following substituted paragraphs:

--Fig. 15 is the oblique figure of the low-pass filter 70. The pattern 72a for the series inductance and the pattern 72b for the parallel [capacity] capacitance are formed in series [and in turns] on one side of the dielectric substrate 71. Moreover, the earthed conductor 73 is formed on another side of substrate. Plastering the dielectric substrate 71 form[ed]s the patterns 72a and 72b to the dielectric substrate 75 formed the earthed conductor 76 forms the band-pass filter 70 having the tri-plate structure. Changing the area and position of the earthed conductor 76 by forming the area without the earthed conductor 76 on side formed on the earthed conductor 76 provides the desired frequency characteristic, as the band-pass filter.

Fig. 16 is the oblique figure of the high-pass filter. The patterns 82a and 82b for the parallel inductance are formed on one side of the dielectric substrate 81 and the earthed conductor 83 is formed on another side of the dielectric substrate 81. The edges of the patterns 82a and 82b are shorted with the earthed conductor 83. Producing the series [capacity] capacitance opposite to the patterns 82a and 82b and connecting the patterns with the earthed conductor 83 to form the patterns 86a and 86b and 86c for the parallel inductance on one side of

the dielectric substrate 85. The earthed conductor 83 is formed on the side that is not signal input and output side. Moreover, the earthed conductor 83 is formed on one side of the dielectric [89] substrate 88.--

Please replace paragraphs 2 and 3 on page 12 and the first paragraph on page 13 with the following substituted paragraphs:

--The dielectric substrate 85 plasters to the patterns 82a and 82b on the dielectric substrate 81 and the dielectric substrates 88 plasters to the pattern 86 on the dielectric substrate 85. When the dielectric substrate 81 plasters to the dielectric substrate 85, the dielectric substrate 85 interposes between the patterns 82a and 82b and the patterns 86a and 86b. When the dielectric substrate 85 plasters to the dielectric substrate 88, the dielectric substrate 88 interposes between the pattern 86 and the earthed conductor 89. In this case the dielectric substrate 81 plasters to the dielectric substrate 88[, at the same time,] while the earthed conductor 83 connects with earthed conductor 87 and the earthed conductor 87 connects with the earthed conductor 89 so that it forms the high-pass filter having tri-plate structure. In this case, changing the area and position of the earthed conductor 89 by forming the area without the earthed conductor 89 on the side formed the earthed conductor 89 provides the desired frequency characteristic.

Moreover, the present circuit device is not limited to the distributed circuit device. In adjustment of characteristics of the coupler, antenna and the combination between layers of the distributed parameter device, changing the area and position of the earthed conductor provides the desired frequency characteristic. Fig. 17 is the oblique figure of the coupler 90, which cuts a direct correct portion. The coupler 90 has the part of the pile of the length about 1/4 λ of the conductive pattern 92a formed on the dielectric substrate 91 and the conductive pattern 92b formed on the substrate 91. If the area and position of the earthed conductor 93 formed outside

of conductive patterns 92a and 92b [become to change easily] changes, you can get the desired coupler. Fig. 18 is the oblique figure of the directional coupler 95 [in same way] wherein if the area and position of the earthed conductor 96 formed outside [become to change easily,] changes you can get the desired directional coupler. Fig. 19 shows the superficial antenna. The patch 101 for receiving and transmitting of the electric wave connects with the electric supply line 102. When the protective layer 10[4]3 [si]is formed on the side formed where the patch 101 is formed, if the area and position of the earthed conductor 105 on the backside [becomes to change easily] changes you can get the desired superficial antenna. Fig. 20 is the oblique figure of the lumped parameter circuit device having the condenser and coil formed by the conductive pattern. For example, changing the area and position of the earthed conductor 112 which is formed opposite to the coil 110 to change the capacity of the coil 110 and the earthed conductor 112, provides the desired characteristic.--

Please replace paragraphs 1 and 2 on page 14 with the following substituted paragraphs:

--In addition, because of forming the pattern, which can change the area and position on the earthed conductor, it is possible to get easily the desired frequency characteristic by using the pattern. In [the] this case, the pattern is formed on one side or plural sides of the dielectric substrate, the adjustment range of the frequency characteristic can be expanded and the adjustment precision can be enhanced by forming the same or [difference] different pattern.

In the circuit device, having the conductive pattern which is formed on the inside layer of the first area of the dielectric substrate and the earthed conductor which formed on [outside are] the outside area of the first area of the dielectric substrate, setting up the frequency characteristic using the conductive pattern and changing the area and position of the desired frequency characteristic of the earthed conductor provides the desired frequency characteristic. Moreover,

it is possible to process the signal without noise or the influence of signal transmission lines by using the printed board having the circuit mounting part which has the signal processing circuit that is formed on the area which is difference from the circuit device parts and the first area of the dielectric substrate[, said] herein the signal processing circuit processes the desired frequency characteristic signal.--

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